



PERFORMANCE MEDIA INDUSTRIES, LTD.

Laser Sharp
9/2007

by A. Grimani

New Technology

Every once in a while a technology shows up that grabs my attention. This happened most recently with a new application of laser technology. It wasn't some radical new technique for hair or tattoo removal, or cutting tools, either. In fact, it was much closer to home. I am speaking, of course, of laser projection.

Now, what, you may ask, is laser projection? Do I mean that laser light shows are being re-purposed for the sake of displaying our favorite action heroes larger than life in 1080p? Actually, no. Laser projection refers to the practice of using red, green, and blue lasers instead of light bulbs (lamps) for front- and rear-projection digital display devices like DLP, LCD, and LCoS. That's a pretty awesome concept, huh?

More Than Fringe Benefits

The actual technology behind laser projection is pretty heavy stuff, so let's leave that for engineers to discuss in white papers. What really matters to us are the cool benefits and advancements afforded by laser projection. Here's a brief look at some of the improvements we could see:

Wider Color Gamut: Laser projection supports a color gamut that greatly exceeds what lamp-based light sources can provide. In some cases, we're talking about a 200% increase over the number of colors available for NTSC (the analog television standard we've lived with for the better part of 50 years).

Longer Lifespan: Laser light sources can last up to 20,000 hours at 100% light output! Compare that to only 2,000 to 5,000 hours for typical projection lamps, which - to add insult to injury - grow dimmer over that time. Think about how great it would be to not have to spend \$500 on a new lamp every year or so!

More Accurate Grayscale/Colorimetry: If you've had any experience calibrating lamp projectors, you know that factory greyscales can be all over the barn. Often they are neither flat nor close to the D65 reference point. Laser projectors can be adjusted at the

factory for much more accurate grayscales, so there is not nearly as much work to do in the field.

More Consistent Grayscale/Colorimetry over Time: Projection lamps change color temperature as they age, necessitating frequent tweaks to the grayscale if you want it to stay accurate. Laser light sources, on the other hand, demonstrate no change in grayscale over time.

Simplified Light Engine Design: The light path for laser projection is much less complex than lamp projection, because there is less need for light shaping and focusing. This leads to clearer images since there are fewer lenses, etc. The cost per lumen for a laser projector should, therefore, be lower than a lamp projector.

Scalable Light Output: Laser light sources can be grouped together to scale a projector's light output to a specific application. If you need more light, add a laser module. If you have too much, take one away. It would be somewhat comparable to having different versions of the same lamp-based projector where the only difference was the wattage of the lamp.

Lower Heat Dissipation: Laser light engines don't produce nearly as much heat as lamps. This means that laser projectors could be smaller and quieter. The need for noisy cooling fans, etc., is greatly reduced.

Remote Light Source: Laser projection opens up all sorts of unique installation opportunities, because the light source can actually be located remotely from the projector. As long as you can run RGB fiber optic lines between the "laser illuminator" and the "projector," you're good to go. In other words, you could have a very small, lightweight, fan-less projection unit mounted to the ceiling of a theater, while the laser light source is located off in a cooled equipment room with the rest of the gear. You don't need a projection room or a hush box around the projector, and the challenge of building a sound-isolated, high-performance optical projection port is a thing of the past.

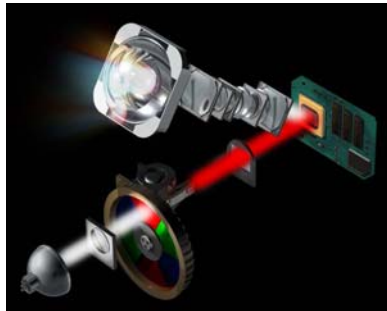
Ready for a Test Drive

So how close are we to seeing some laser projection displays? A few manufacturers have started to work with the [Necsel laser technology](#) developed by [Novalux](#) in the Silicon Valley. Right now, they are mainly making one-piece rear projection DLP, LCD, and LCoS products. However, I recently saw a great-looking demonstration of a modified two-piece, 3-chip DLP projection system. There are still a few bugs to work out, such as the scintillation issues that are inherent to very tightly correlated laser light. The demo I saw used a vibration scheme on the screen to "dither" out the effect. A similar system would be best implemented within the projector.

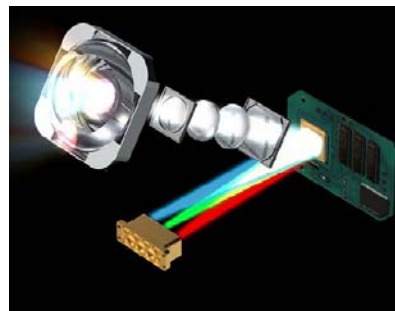
As with any new technology these days, keep an eye out for additional manufacturers to adopt Necsel or some similar laser light source. Laser projection will greatly simplify design and installation issues, giving you better long-term system stability and reliability.

This article is based on a column published by A. Grimani in Residential Systems magazine September 2007. Chase Walton contributed to this article.

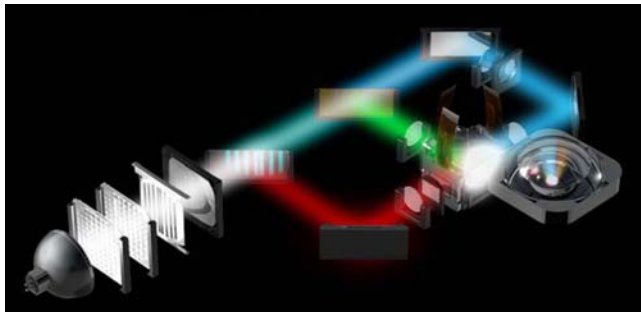
Light Path of Projectors



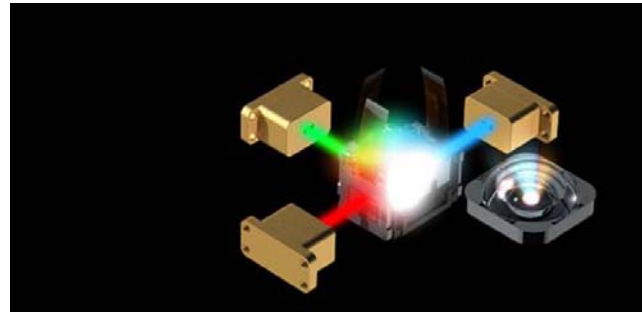
Single-chip DLP Projector



Laser DLP Projection



Three-chip LCD Projector



Laser LCD Projection